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ASSESSMENT OF ICELAND SCALLOP IN THE CANADA-FRANCE TRANSBOUNDARY ZONE OF ST. PIERRE BANK

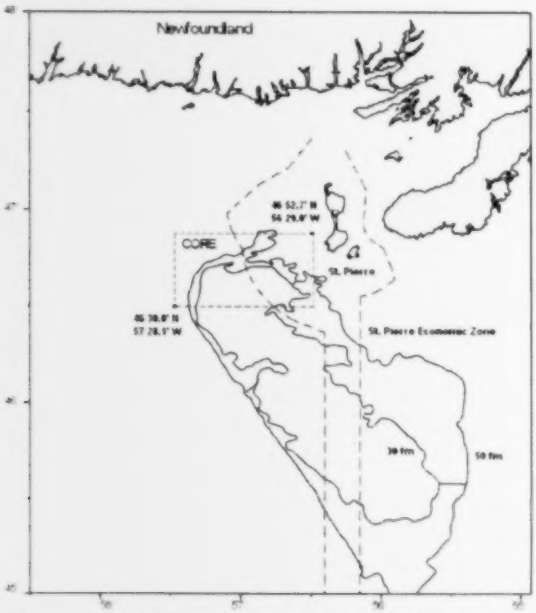

Figure 1: Northern St. Pierre Bank showing the Canada-France Transboundary (CORE) Zone.

Context :

The directed fishery for Iceland Scallops (Chlamys islandica) started on St. Pierre Bank in 1989. Populations off Newfoundland and Labrador are normally found in waters from 50-200m, usually on hard bottom with variable substrate composition, consisting largely of sand, gravel, shell fragments, and stones.

Prior to 1996 the entire catch was taken by Canada. A decision by an International Court of Arbitration in 1992 resulted in jurisdictional changes over the disputed waters to the south of Newfoundland and St. Pierre and Miquelon. Following that decision, an annual catch level (TAC) has been established for an area called the "Transboundary Zone" or simply the "CORE" (Fig. 1). Joint TACs have been in place for the CORE since 1995. France and Canada are allocated a fixed percentage of the TAC, 70% and 30% respectively.

A Canadian research survey was completed in September 2009. The last full assessment of the status of this resource was in 2006. There is no assessment schedule for this resource.

September 2010

Canada

SUMMARY

- Directed fishing for Iceland scallops started in 1989 and landings peaked at 6000 t in 1992. There has been no fishery in the CORE area since 1997 although there is a TAC of 1650 t.
- A Canadian research survey in September 2009 resulted in a minimum dredgeable biomass estimate of 2,900 t which was one third of the virgin biomass in 1990.
- The 2009 survey meat count of 68/500g was the highest in the survey series.
- The biomass estimate has increased since 2005, largely due to an increase in the French zone.
- Predatory Sea Stars were at their lowest level in the survey series in 2009.
- The natural mortality index for Iceland Scallop in 2009 was 12%, down from a high of 88% in 1998.

INTRODUCTION

Species Biology

The Iceland Scallop (*Chlamys islandica*) is widely distributed within the sub-arctic but is also found in fishable aggregations as far south as the coast of Massachusetts. Populations off Newfoundland and Labrador are usually found at depths of 50-200m, usually on hard substrates, consisting largely of sand, gravel, shell fragments, and stones. The Iceland Scallop is a filter-feeder, consuming plankton and detritus, and is associated with areas of strong currents. To reside in such areas, the scallop is attached to the substrate by a byssal thread. Unlike other scallops the byssus is maintained to the adult stage.

Unlike many species of scallops, this species is dioecious (having separate sexes). Iceland Scallops become sexually mature at 3-6 years of age and fully recruit to the commercial fishery at 60mm shell height (about age 9). Spawning in Newfoundland waters begins in April – May and is thought to be initiated by short-term variation in temperature. Eggs are externally fertilized and larvae are planktonic for as long as 10 weeks before settling to the bottom, possibly at considerable distances from the spawning adults. Iceland Scallops frequently live more than 25 years, but seldom exceed 100mm in shell height.

ASSESSMENT

The Fishery

Directed fishing started in 1989 and peaked at 6000 t in 1992. There has been no fishery in the CORE area since 1997 although there was a TAC of 100 t in 1999-2000 and a TAC 400 t in 2001-2005. After the last assessment in 2006 the TAC was increased to 1,650 t (Table 1). Prior to 1996 the entire catch was taken by Canada. The decision by an International Court of Arbitration in 1992 resulted in jurisdictional changes over the disputed waters to the south of

Newfoundland and St. Pierre and Miquelon. Following the decision, an annual catch level (TAC) was established for an area called the "Transboundary Zone" or simply the "CORE" (Fig. 1). France and Canada are allocated fixed percentages of the TAC at 70% and 30% respectively. Joint TACs were first established for the CORE in 1995 at 2800 t. However, less than 10% of the TAC was taken in any one year from 1995 to 1997. Neither Canada nor France has fished the area since 1997.

Table 1: TACs and removals (tonnes).

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001-2005	2006-2009
Tac	-	-	-	-	-	-	2800	3250	2100	2100	100	100	400	1650
Canada	36	507	755	5967	0	0	230	158	4	0	0	0	0	0
France	0	0	0	0	0	0	0	148	118	0	0	0	0	0
Total	36	507	755	5967	0	0	230	306	122	0	0	0	0	0

Research Surveys

Resource assessment surveys were conducted from 1990-93, 1996, 1998, 2005, and 2009 using a stratified random sampling scheme. Stratification was based on area and depth. Sets were optimally allocated in proportion to stratum-specific areas and variance of the catch rates.

The survey area was reduced in 1991 and the strata were redrawn to focus on aggregations of scallops in the north. Strata were redrawn again in 1993 to accommodate the new Canada-France boundary resulting from the decision by the International Court of Arbitration. All subsequent surveys used this stratification scheme (Fig. 2).

A 12ft New Bedford scallop dredge equipped with 3" rings and interconnected with 3-top and 4-bottom link configuration was used prior to 2005 and an 8ft dredge thereafter. Standard tow length was 1.0 nm with the 12ft rake and 0.5 nm with the 8ft rake. Upon completion of each tow (set) dead scallops with non-disarticulated valves ("cluckers") and live scallops, as well as Sea Stars, were sorted by species. Total catches were enumerated and weighed by species. Shell height of scallops was determined from each set based on either the total catch or a sub-sample. Samples were collected from at least one set in each of Strata 11 and 22 to determine meat yield (number of meats per 500g).

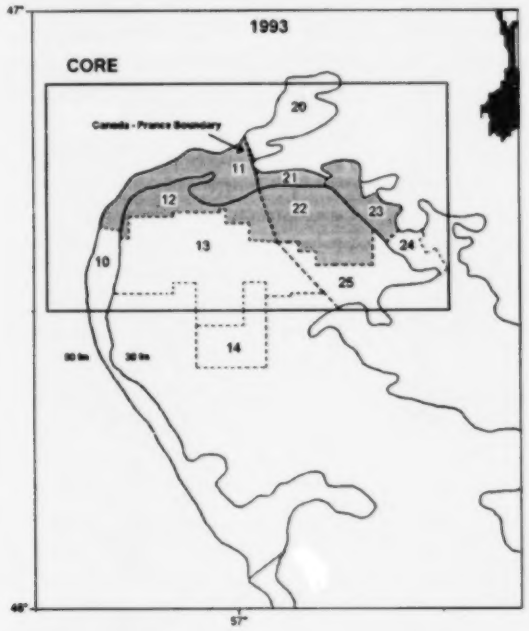

Figure 2: Northern St. Pierre Bank showing the main "commercial" strata (shaded) for Iceland Scallop.

Biomass

The 2009 minimum dredgeable biomass (MDB) estimate of 2,900 t was one third of the virgin biomass in 1990. Although this biomass estimate was based on all strata only a few contained the bulk of the scallop biomass. It was in these strata that most of the fishing effort was directed in the past. These main "commercial" strata (11, 12, 21, 22 and 23; Fig. 2) usually account for 90% or more of the entire Iceland Scallop biomass in the CORE area (Table 2). In the commercial strata, the MDB decreased significantly from about 7000 t in the early 1990s to a low of 764 t in 1998. The 2009 biomass estimate in commercial strata was 2700 t.

Table 2: Minimum dredgeable biomass estimates for the CORE area and the main commercial strata.

	CORE		Commercial strata		
Year	Area ($n.mi^2$)	MDB (t,round)	Area ($n.mi^2$)	MDB (t, round)	% of Total MDB
1990	428.4	8886	234.6	8729	98%
1991	208.3	6811	183.6	6801	100%
1992	266.1	7383	183.6	7184	97%
1993	234.2	5039	187.6	3674	73%
1996	269.1	2246	187.6	2171	97%
1998	269.1	778	187.6	764	98%
2005	269.1	2165	187.6	2073	96%
2009	251.2	2899	187.6	2714	94%

The 2009 survey meat count of 68/500g was the highest in the survey series despite no major change in scallop size, indicating reduced yield.

Between 1993 and 2005, biomass decreased in the French zone and increased in the Canadian zone (Fig 3). The percentage of the MDB in the Canadian zone increased from 14% in 1993 to 68% in 2005. The biomass increased again in 2009 due mainly to an increase in the biomass in the French zone. The percentage of the MDB in the Canadian zone in 2009 is estimated at 57%. This change in spatial distribution of biomass could not be explained by fishery removals but could be due to predation.

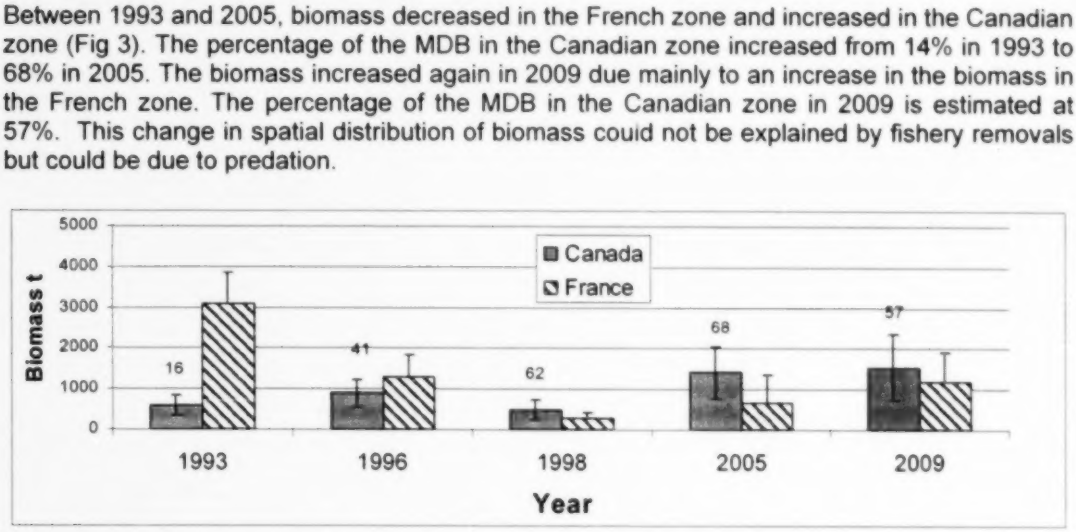

Figure 3: Biomass estimates from commercial strata in the Canadian zone (strata 11,12) and the French zone (strata 21,22,23).

Mortality

The natural mortality index (computed as the proportion of cluckers to live scallops) was relatively low (15%) in the early 1990's and increased throughout that decade. This index decreased from a high of 88% in 1998 to 12% in 2009.

Figure 4: Mortality Index for Iceland Scallop in the Core area.

Predation

In the early to mid-1990s a high abundance of predatory Sea Stars contributed to significant mortality in Iceland Scallop in the CORE area (Lawrence *et al.*, 1997; Naidu *et al.*, 2001). The change in spatial distribution of the scallop biomass between 1993 and 2005 was associated with a high biomass of Sea Stars within stratum 22 in the French zone during 1996 to 1998. Biomass of all Sea Stars species increased to a high of 1600 t (MDB) in 1998, when Iceland Scallop biomass was at its lowest (Table 2). Since the 1996 survey, Sea Stars have been enumerated by species. In the French zone, biomass of *Leptasterias polaris* and *Crossaster pappossus*, the two main predatory species on St. Pierre Bank, increased between 1996 and 1998 and were at the lowest level in the survey series in 2009.

CONCLUSIONS

The biomass estimate has increased from 2200 t in 2005, to 2900 t in 2009, largely due to an increase in the French zone. This estimate is one third of the virgin biomass of 1990. The 2009 survey meat count of 68/500g was the highest in the survey series despite no major change in scallop size, indicating reduced yield. The 2009 natural mortality index was at a low of 12% which is associated with the lowest level of predatory Sea Stars observed since the start of the fishery.

SOURCES OF INFORMATION

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FOR MORE INFORMATION

Contact: Don Stansbury
P.O. Box 5667
St. John's, NL A1C 5X1
Tel: (709) 772-0559
Fax: (709) 772-4105
E-Mail: Don.stansbury@dfo-mpo.gc.ca

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